
Benefits of Green Buildings: Future Outlook for Electricity Prices

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Overview of Presentation

- Assessments of green buildings should consider long-term planning horizon.
- Factors driving electricity prices in the medium- to long-term.
- Transmission upgrades.
- Wholesale electricity prices.
- Impact of natural gas prices.
- Cost of compliance with future environmental regulations.
- Other benefits beyond electricity prices.

Long-Term Planning Horizon

- Life-cycle cost approach: consider costs and benefits for the full remaining life of the building (or the green measure, whichever is shorter).
- Costs of green buildings tend to occur in the early years.
- Savings tend to occur over many years.
- Buildings can last many years.
 - Existing buildings: 10, 20, 50 years.
 - New buildings: 50 years or more.
- Unless the long-term benefits are accounted for, there will be a bias in favor of the costs, limiting the adoption of green measures.

Electricity Prices

- One of the primary benefits of green buildings is lower electricity bills. Thus, electricity prices have a large impact on total benefits.
- Electricity prices today in Boston (generation only):
 - Standard Offer: roughly 5.0 ¢/kWh (\$50/MWh)
 - Default Services: roughly 6.5 ¢/kWh (\$65/MWh)
- Key factors driving future electricity prices:
 - Transmission upgrades in the region.
 - Wholesale electricity prices.
 - Natural gas prices.
 - Need for new power plants.
 - Future environmental regulations.
- Overall outlook for future electricity prices: going up.

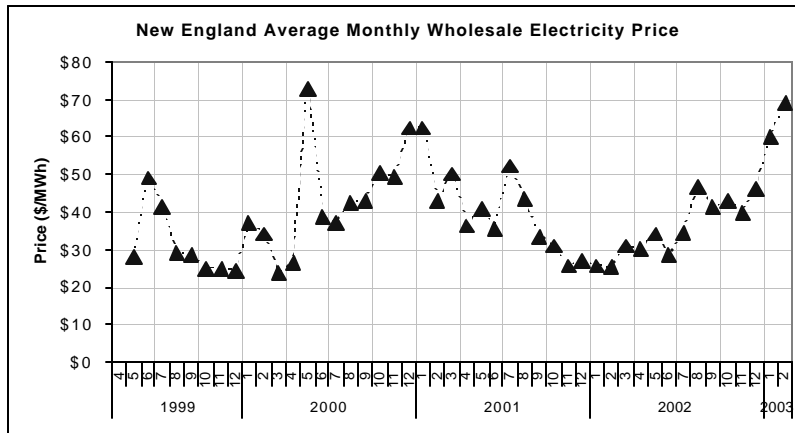
Transmission Upgrades

- Regional Transmission Expansion Plan from the Independent System Operator New England (ISO-NE) encourages significant expansion of regional transmission lines:
- Generation has increased by over 30% since 1999, but transmission investments have lagged way behind.
- Recommends \$1.5 to \$3 billion in transmission investments over the next five to ten years.
- Recommends 40 new transmission projects as “must do” upgrades.
- The areas with the worst transmission problems include:
 - Southwest Connecticut.
 - Greater Boston and Northeast Massachusetts.
 - Northwest Vermont.

Wholesale Electricity Prices

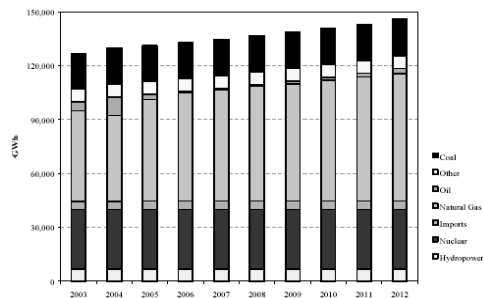
- Since deregulation, New England wholesale electricity prices are playing a more direct role in retail electricity prices.
- When Standard Offer prices are eliminated in March 2005, wholesale electricity prices will play an even greater role in setting retail prices.
- Wholesale prices in recent years have been volatile (next slide).
- Volatility creates two potential problems:
 - Over-reliance upon short-term electricity purchases means that retail prices will be volatile.
 - Reliance upon longer-term electricity contracts creates other risks.
- Green building measures reduce a customer's price volatility by reducing reliance upon electricity purchases.

New England Wholesale Prices Have Been Volatile



Natural Gas Role in New England Electricity Market

- Natural gas plays an increasingly large role in the generation of electricity in New England, and thus in setting the price of electricity.
- In 1999 gas was responsible for 16% of generation, by 2010 it is expected to be responsible for roughly 50% of generation.

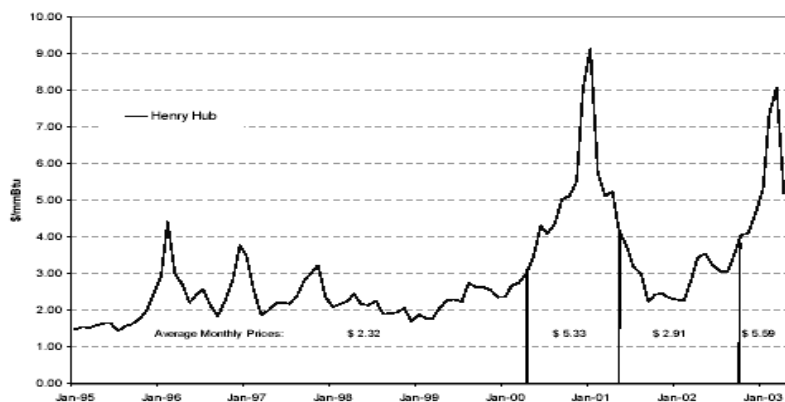


- Source: Levitan and Associates, *Natural Gas and Fuel Diversity Concerns in New England and the Boston Metropolitan Electric Load Pocket* prepared for ISO-NE, July 2003.

Natural Gas Prices

- Demand for natural gas has increased dramatically in recent years, partly as a result of increased use for electricity generation.
- US demand for natural gas is expected to exceed domestic supply:
 - This leads to increased demand for new sources of domestic gas, leading to increased prices and volatility.
 - It also leads to increased reliance upon imports of liquefied natural gas (LNG).
- Natural gas prices have increased dramatically in recent years, and are expected to continue to increase in the future (next slide).
- This week natural gas prices jumped to \$7/MMBtu – much higher than typical prices in recent years.

Natural Gas Price Volatility and Trends

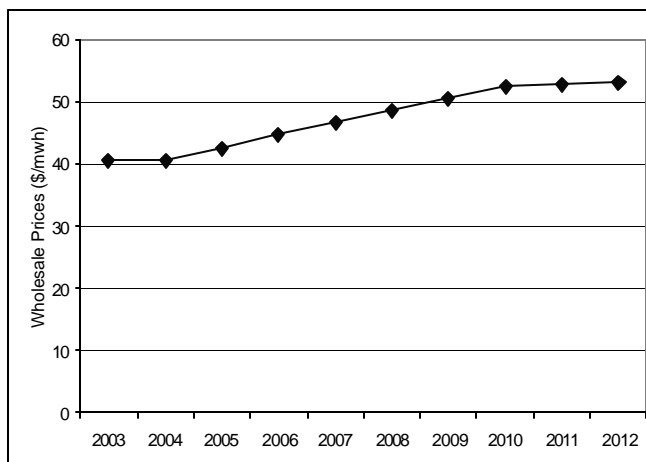


- Source: Levitan and Associates, *Natural Gas and Fuel Diversity Concerns in New England and the Boston Metropolitan Electric Load Pocket*, prepared for ISONE, July 2003.

Need for New Power Plants

- The point in time when a new power plant is needed in New England will influence the wholesale market price.
- There is currently sufficient power plants in New England to meet demand, so new plants are not expected for several years.
- Electricity prices are likely to increase over time as the power supply tightens.
- New power plants will be needed in the 2010-2012 time frame.
- By then, wholesale electricity prices would be on the order of \$52/MWh – roughly 30% higher than today's prices (next slide).
- If gas prices increase more than forecast, electricity prices will be higher. If gas is at \$7/MMBtu in 2010, the electricity price would be roughly \$71/MWh – roughly 78% higher than today.

Illustrative Wholesale Electricity Price Forecast: New Plant in 2010



Compliance With Future Environmental Regulations

- Most forecasts of electricity prices do not account for the costs of power plants complying with future environmental regulations.
- The power plants in New England are likely to be subject several types of environmental regulations in the medium- to long-term future:
 - SO₂
 - NO_x
 - Particulates
 - Mercury
 - CO₂
 - Multi-pollutant regulations
- CO₂ Regulations could have a significant impact on New England electricity prices, given its reliance upon natural gas and coal.

New England Actions to Address Climate Change

- New England Governor's Conference (NEGC) and Eastern Canadian Premiers (ECP) Climate Change Action Plan:
- Short-term goal: reduce greenhouse gas emissions to 1990 levels by 2010.
- Mid-term goal: reduce greenhouse gas emissions to 10% below 1990 levels by 2020, and institute a 5-year planning process to adjust goals and establish new targets.
- Long-term goal: reduce greenhouse gas emissions to levels that no longer pose a threat to climate – will require reductions of 75-80% of current levels of emissions.

N.E. State Actions to Address Climate Change (I)

- Connecticut: In spring of 2003 initiated a stakeholder process to develop a climate change action plan. Report due soon.
- Maine: In June 2003 passed legislation:
 - By July 2004 prepare a Climate Change Action Plan to reduce CO2 emissions to levels similar to those required by the NEGC/ECP Climate Change Action Plan.
 - Inventory and reduce CO2 emissions from state-funded programs and facilities.
 - Create 50 partnerships with business and non-profits to reduce CO2.
- Massachusetts: Currently drafting a Climate Change Action Plan to “meet or exceed” regional goals established by the NEGC/ECP Climate Change Action Plan.

N.E. State Actions to Address Climate Change (II)

- New Hampshire: In December 2001 issued a menu of policy options designed to achieve the goals established by the NEGC/ECP. Includes 70 recommendations for voluntary and regulatory approaches, but does not estimate CO2 reductions or include a concrete timeline.
- Rhode Island: In July 2002 issued a Climate Change Action Plan designed to achieve the goals established by the NEGC/ECP.
 - Includes 52 program and policy options.
 - Establishes 29 high priority options
 - Includes concrete reduction estimates, policy recommendations, and process for implementing policies.
- Vermont: IN August 2002 Governor issued an Executive Order with a goal of reducing GHG emissions from state buildings by 25% over ten years. Working Group will produce a biennial report, and Agency of Natural Resources will identify actions and targets.

Summary of Electricity Price Outlook

- Transmission costs increasing.
- Reliance upon wholesale market prices increasing.
- Reliance upon natural gas increasing.
- Prices of natural gas increasing.
- Environmental regulations increasing.
- Retail electricity prices increasing.
- Benefits of Green Buildings increasing.

Other Significant Benefits Beyond Electricity Prices

- Other fuel types (oil, gas) are saved.
- Additional environmental benefits.
- Reduction in electricity price volatility.
- Reduced pressure on wholesale market prices.
- Reduced pressure on natural gas demand.